

APPENDIX 3-D

CALAVERAS COUNTY WATER DISTRICT

Income Survey

Feasibility Study for Vallecito/Douglas Flat Reservoir

APPENDIX 3-D-1

CALAVERAS COUNTY WATER DISTRICT

INCOME SURVEY

CALAVERAS COUNTY WATER DISTRICT

Community Income Survey

Executive Summary

The Calaveras County Water District (CCWD) recently completed a community income survey to calculate the median household income for the District's service area. CCWD completed this survey in preparation of an application to the State Water Resources Control Board for grant and loan funding to assist in financing upgrades and improvements to the existing waste water treatment facility. This survey was required to estimate the most accurate reflection of the CCWD service area's current median household income. The available data from the 2000 US Census is outdated and reflects a larger area than the actual service area boundary and a potentially skewed median household income. The survey was conducted over a period of 2 months, commencing in January 2011. The Income Survey process included development of methodology, marketing material, and the survey form; distribution and collection of the survey; data entry and analysis of survey responses; and the drafting of the final report. The sample size was originally determined at 242 household, with 168 responses received. The survey's responses included data on whether the household lived in the unit for at least 6 months out of the year and the household's annual income (January 1, 2010 – December 31, 2010). The response results found a median household income of CCWD's service area to be \$36,500.

Methodology

The survey was designed according to guidelines distributed by the State Water Resources Control Board. According to these guidelines each possible measure was taken to ensure the survey's statistical validity and success. The following process outlines the methodology for the Calaveras County Water District. First, the survey area was defined to include the Calaveras County Water District (CCWD) service area. This area included portions of the areas known as Douglas Flat and Vallecito. According to the 2000 U.S. Census, the survey area is included in the larger Census tract 1.01, Block Group 5. According to the CCWD's records, there are 325 hook-ups in the survey area. To gather the household income of the survey area only residential units with occupants living

in the unit at least 6 months out of the year were included in the sample size. Therefore, the survey sample size was drawn based on a universe with 242 households.

This sample was drawn from the table listed below, found in the guidelines distributed by the State Water Resources Control Board. According to this table, the minimum number of responses needed for a valid survey is 57% of the number of households in the universe. For the survey area with 242 households, a minimum of 138 responses must be collected. To ensure a valid survey and accurate results the entire universe will be surveyed. This method will account for non-respondents, unavailable respondents and provide the minimum number of responses required. This survey sample will also allow for the most comprehensive representation of the area's median household income.

Households in Universe	Sample Size as percentage
1 - 55	90
56 - 63	87
64 - 70	85
71 - 77	84
78 - 99	80
100 - 115	78
116 - 153	72
154 - 180	69
181 - 238	67
239 - 308	57
309 - 398	50
399 - 650	38
651 - 1,200	25
1,201 - 2,700	13
2,701 - or more	10

The survey was selected to be a combination mail-in and door-to-door survey. To meet this sample size resident address lists were collected from the CCWD service listing.

We created the survey to be used for both the mail in and door-to-door interviews. The questions were therefore kept consistent and did not leave room for individual interpretation by an interviewer and interviewee. Questions were structured to elicit non-biased responses. The survey included a total of two concise questions. For example, questions did not include a lead-in prompt that

may have suggested the respondent answer in favor of one answer or another. Rather, questions simply prompted for direct answers.

To ensure a high response rate the survey was publicized using a letter informing residents of the upcoming survey. The letter was designed to educate the residents and assure the use of confidentiality throughout the survey process. The following steps were taken to ensure validity of the survey: the survey remained confidential, the survey avoided biased or loaded questions that would skew the survey outcomes, the survey included a self addressed stamped return envelope to increase the response rate, and the survey was publicized to encourage resident participation and increase the response rate.

The survey included instructions on the following methods available to return the survey: return by mail using an included self-addresses stamped envelope, or replying online via a website created by surveymonkey.com. Confidentiality of the survey was maintained in the collection process by using a coding system to track responses. A code was assigned to each household in the sample size. The code was then printed on the survey form and used to track responses. This code was the only identifying information included on the survey form and requested in the online service. The address list and survey responses were kept confidential – only the water district staff and the survey administrator had access to the files.

The door-to-door survey was conducted to collect a remainder of responses required to elicit a valid survey response rate. This door-to-door survey was conducted over the duration of a day by a staff member of the survey administrators. This was conducted on a weekday during various times of the time to ensure a random selection of residents would be available to respond to the survey. The households surveyed in the door-to-door survey were selected at random.

Analysis

A total of 242 surveys were mailed to the households included in the sample size from CCWD's service area. Out of the 242 mailed out 3 were returned by the post office because of vacant units. A total of 168 responses were received, including a total of 8 responses from non-primary residents (residents living in the unit less than 6 months out of the year). These vacancies and non-primary residents reduced the sample size originally outlined in the methodology above.



The revised sample size, less the vacancies and non-primary residents, totaled 231.

Survey Summary

Total surveys mailed:	239
Total Responses Received:	168
Non-primary Resident Responses:	11
Primary Resident Responses:	157
Original Sample Size:	239
Less non-primary residents:	8
Revised Sample Size:	231

Out of the 168 responses received, 157 were from households living there at least 6 months out of the year. This response rate equates to 67.97% of the sample size, above the 67% required for a valid survey as outlined by the State Water Resources Control Board. The median household income calculated from these 157 responses is: \$36,500. See attached Median Household Income Survey Results Table for the breakdown of the household incomes collected.

Survey Response Summary

Number of Survey Responses	157
Sample Size	231
Percentage Response	67.97%
Median Household Income	\$36,500

CALAVERAS COUNTY WATER DISTRICT Community Income Survey
Calaveras Country, California

MEDIAN HOUSEHOLD INCOME SURVEY RESULTS

Survey Number	Code	Date Received	Gross Income Reported	MHI Ascending Order
1	146	3/4/2011	Less than \$10,000	\$10,000.00
2	242	2/22/2011	Less than \$10,000	\$10,000.00
3	280	1/21/2011	Less than \$10,000	\$10,000.00
4	308	1/21/2011	Less than \$10,000	\$10,000.00
5	328	2/15/2011	Less than \$10,000	\$10,000.00
6	335	1/21/2011	Less than \$10,000	\$10,000.00
7	341	1/26/2011	Less than \$10,000	\$10,000.00
8	124	3/4/2011	\$10,000 - \$11,000	\$10,500.00
9	162	3/2/2011	\$10,000 - \$11,000	\$10,500.00
10	233	1/21/2011	\$10,000 - \$11,000	\$10,500.00
11	317	1/21/2011	\$10,000 - \$11,000	\$10,500.00
12	338	1/21/2011	\$10,000 - \$11,000	\$10,500.00
13	198	1/21/2011	\$11,000 - \$12,000	\$11,500.00
14	275	1/26/2011	\$10,000 - \$11,000	\$11,500.00
15	303	1/21/2011	\$10,000 - \$11,000	\$11,500.00
16	293	1/21/2011	\$13,000 - \$14,000	\$13,500.00
17	229	2/15/2011	\$14,000 - \$15,000	\$14,500.00
18	329	3/4/2011	\$14,000 - \$15,000	\$14,500.00
19	223	2/15/2011	\$15,000 - \$16,000	\$15,500.00
20	314	1/21/2011	\$15,000 - \$16,000	\$15,500.00
21	277	1/21/2011	\$16,000 - \$17,000	\$16,500.00
22	284	1/21/2011	\$16,000 - \$17,000	\$16,500.00
23	158	2/22/2011	\$18,000 - \$19,000	\$18,500.00

24	183	2/22/2011	\$18,000 - \$19,000	\$18,500.00
25	273	1/21/2011	\$18,000 - \$19,000	\$18,500.00
26	137	3/4/2011	\$19,000 - \$20,000	\$19,500.00
27	149	1/21/2011	\$19,000 - \$20,000	\$19,500.00
28	171	1/21/2011	\$19,000 - \$20,000	\$19,500.00
29	257	1/21/2011	\$19,000 - \$20,000	\$19,500.00
30	321	1/21/2011	\$19,000 - \$20,000	\$19,500.00
31	324	1/21/2011	\$19,000 - \$20,000	\$19,500.00
32	325	2/22/2011	\$19,000 - \$20,000	\$19,500.00
33	204	2/22/2011	\$20,000 - \$21,000	\$20,500.00
34	206	1/21/2011	\$20,000 - \$21,000	\$20,500.00
35	270	1/21/2011	\$20,000 - \$21,000	\$20,500.00
36	288	1/21/2011	\$20,000 - \$21,000	\$20,500.00
37	337	2/22/2011	\$20,000 - \$21,000	\$20,500.00
38	291	1/21/2011	\$21,000 - \$22,000	\$21,500.00
39	305	2/22/2011	\$21,000 - \$22,000	\$21,500.00
40	300	2/2/2011	\$21,000 - \$22,000	\$21,500.00
41	167	2/2/2011	\$23,000 - \$24,000	\$23,500.00
42	276	1/21/2011	\$23,000 - \$24,000	\$23,500.00
43	311	1/26/2011	\$23,000 - \$24,000	\$23,500.00
44	127	3/4/2011	\$24,000 - \$25,000	\$24,500.00
45	132	1/21/2011	\$24,000 - \$25,000	\$24,500.00
46	133	3/4/2011	\$24,000 - \$25,000	\$24,500.00
47	136	1/21/2011	\$24,000 - \$25,000	\$24,500.00
48	141	3/2/2011	\$24,000 - \$25,000	\$24,500.00
49	340	1/21/2011	\$24,000 - \$25,000	\$24,500.00
50	107	3/4/2011	\$25,000 - \$26,000	\$25,500.00
51	184	1/21/2011	\$25,000 - \$26,000	\$25,500.00

52	265	1/21/2011	\$25,000 - \$26,000	\$25,500.00
53	318	3/4/2011	\$25,000 - \$26,000	\$25,500.00
54	207	3/4/2011	\$26,000 - \$27,000	\$26,500.00
55	251	1/21/2011	\$26,000 - \$27,000	\$26,500.00
56	330	1/26/2011	\$26,000 - \$27,000	\$26,500.00
57	122	1/21/2011	\$27,000 - \$28,000	\$27,500.00
58	143	1/21/2011	\$27,000 - \$28,000	\$27,500.00
59	316	3/4/2011	\$27,000 - \$28,000	\$27,500.00
60	128	3/4/2011	\$28,000 - \$29,000	\$28,500.00
61	181	2/15/2011	\$28,000 - \$29,000	\$28,500.00
62	336	2/22/2011	\$28,000 - \$29,000	\$28,500.00
63	224	2/2/2011	\$29,000 - \$30,000	\$29,500.00
64	241	2/15/2011	\$29,000 - \$30,000	\$29,500.00
65	244	1/21/2011	\$29,000 - \$30,000	\$29,500.00
66	258	1/21/2011	\$29,000 - \$30,000	\$29,500.00
67	296	1/21/2011	\$29,000 - \$30,000	\$29,500.00
68	315	3/4/2011	\$29,000 - \$30,000	\$29,500.00
69	173	2/15/2011	\$30,000 - \$31,000	\$30,500.00
70	213	1/26/2011	\$30,000 - \$31,000	\$30,500.00
71	268	3/4/2011	\$30,000 - \$31,000	\$30,500.00
72	327	1/21/2011	\$31,000 - \$32,000	\$31,500.00
73	256	3/4/2011	\$32,000 - \$33,000	\$32,500.00
74	307	3/4/2011	\$32,000 - \$33,000	\$32,500.00
75	177	2/25/2011	\$33,000 - \$34,000	\$33,500.00
76	205	3/4/2011	\$33,000 - \$34,000	\$33,500.00
77	245	2/22/2011	\$33,000 - \$34,000	\$33,500.00
78	309	1/21/2011	\$33,000 - \$34,000	\$33,500.00
79	109	2/2/2011	\$36,000 - \$37,000	\$36,500.00

80	202	2/15/2011	\$36,000 - \$37,000	\$36,500.00
81	236	3/4/2011	\$36,000 - \$37,000	\$36,500.00
82	281	1/21/2011	\$36,000 - \$37,000	\$36,500.00
83	179	3/4/2011	\$37,000 - \$38,000	\$37,500.00
84	254	1/21/2011	\$37,000 - \$38,000	\$37,500.00
85	262	3/4/2011	\$37,000 - \$38,000	\$37,500.00
86	320	1/21/2011	\$37,000 - \$38,000	\$37,500.00
87	130	1/21/2011	\$39,000 - \$40,000	\$39,500.00
88	152	1/26/2011	\$39,000 - \$40,000	\$39,500.00
89	266	3/4/2011	\$39,000 - \$40,000	\$39,500.00
90	289	1/21/2011	\$39,000 - \$40,000	\$39,500.00
91	261	2/15/2011	\$40,000 - \$41,000	\$40,500.00
92	112	3/4/2011	\$41,000 - \$42,000	\$41,500.00
93	191	2/22/2011	\$41,000 - \$42,000	\$41,500.00
94	211	3/4/2011	\$43,000 - \$44,000	\$43,500.00
95	259	2/15/2011	\$43,000 - \$44,000	\$43,500.00
96	199	3/4/2011	\$45,000 - \$46,000	\$45,500.00
97	214	1/21/2011	\$46,000 - \$47,000	\$46,500.00
98	131	2/22/2011	\$48,000 - \$49,000	\$48,500.00
99	298	2/15/2011	\$48,000 - \$49,000	\$48,500.00
100	301	1/21/2011	\$48,000 - \$49,000	\$48,500.00
101	194	1/21/2011	\$49,000 - \$50,000	\$49,500.00
102	210	1/21/2011	\$49,000 - \$50,000	\$49,500.00
103	228	1/21/2011	\$49,000 - \$50,000	\$49,500.00
104	243	1/21/2011	\$49,000 - \$50,000	\$49,500.00
105	247	1/21/2011	\$49,000 - \$50,000	\$49,500.00
106	253	1/21/2011	\$49,000 - \$50,000	\$49,500.00
107	332	2/22/2011	\$49,000 - \$50,000	\$49,500.00

108	129	2/2/2011	\$50,000 - \$51,000	\$50,500.00
109	134	2/15/2011	\$50,000 - \$51,000	\$50,500.00
110	250	1/21/2011	\$50,000 - \$51,000	\$50,500.00
111	260	1/21/2011	\$50,000 - \$51,000	\$50,500.00
112	283	2/2/2011	\$50,000 - \$51,000	\$50,500.00
113	339	1/26/2011	\$50,000 - \$51,000	\$50,500.00
114	150	1/21/2011	\$51,000 - \$52,000	\$51,500.00
115	218	1/21/2011	\$52,000 - \$53,000	\$52,500.00
116	333	2/15/2011	\$52,000 - \$53,000	\$52,500.00
117	225	1/26/2011	\$54,000 - \$55,000	\$54,500.00
118	287	1/21/2011	\$55,000 - \$56,000	\$55,500.00
119	101	1/21/2011	\$56,000 - \$57,000	\$56,500.00
120	187	2/15/2011	\$57,000 - \$58,000	\$57,500.00
121	252	1/21/2011	\$59,000 - \$60,000	\$59,500.00
122	176	1/21/2011	\$60,000 - \$61,000	\$60,500.00
123	182	1/21/2011	\$60,000 - \$61,000	\$60,500.00
124	248	2/22/2011	\$60,000 - \$61,000	\$60,500.00
125	267	2/15/2011	\$62,000 - \$63,000	\$62,500.00
126	279	1/21/2011	\$62,000 - \$63,000	\$62,500.00
127	166	1/21/2011	\$63,000 - \$64,000	\$63,500.00
128	201	2/2/2011	\$64,000 - \$65,000	\$64,500.00
129	302	1/26/2011	\$67,000 - \$68,000	\$67,500.00
130	114	1/21/2011	\$68,000 - \$69,000	\$68,500.00
131	310	1/21/2011	\$68,000 - \$69,000	\$68,500.00
132	249	1/21/2011	\$70,000 - \$71,000	\$70,500.00
133	190	1/21/2011	\$74,000 - \$75,000	\$74,500.00
134	278	2/2/2011	\$74,000 - \$75,000	\$74,500.00
135	313	3/4/2011	\$75,000 - \$76,000	\$75,500.00

136	157	1/21/2011	\$77,000 - \$78,000	\$77,500.00
137	195	1/26/2011	\$77,000 - \$78,000	\$77,500.00
138	319	1/21/2011	\$77,000 - \$78,000	\$77,500.00
139	197	1/21/2011	\$80,000 - \$81,000	\$80,500.00
140	263	1/21/2011	\$80,000 - \$81,000	\$80,500.00
141	312	1/21/2011	\$80,000 - \$81,000	\$80,500.00
142	104	2/2/2011	\$89,000 - \$90,000	\$89,500.00
143	111	1/21/2011	\$89,000 - \$90,000	\$89,500.00
144	121	1/21/2011	\$89,000 - \$90,000	\$89,500.00
145	219	1/21/2011	\$89,000 - \$90,000	\$89,500.00
146	234	2/15/2011	\$89,000 - \$90,000	\$89,500.00
147	322	2/15/2011	\$89,000 - \$90,000	\$89,500.00
148	142	1/21/2011	Over \$90,000 (\$180,000.00)	\$180,000.00
149	147	2/22/2011	Over \$90,000 (\$237,500.00)	\$237,500.00
150	148	1/21/2011	Over \$90,000 (\$105,000.00)	\$105,000.00
151	163	2/22/2011	Over \$90,000 (\$105,500.00)	\$105,500.00
152	164	1/21/2011	Over \$90,000 (\$135,000.00)	\$135,000.00
153	188	1/26/2011	Over \$90,000 (\$155,000.00)	\$155,000.00
154	192	1/21/2011	Over \$90,000 (\$100,500.00)	\$100,500.00
155	286	1/21/2011	Over \$90,000 (\$90,500.00)	\$90,500.00
156	323	1/21/2011	Over \$90,000 (\$105,000.00)	\$105,000.00
157	326	2/15/2011	Over \$90,000 (\$148,500.00)	\$148,500.00
	Number of Survey Responses:			157
	Number of Homes Surveyed:			231
	Percentage Response:			67.97%
	Median Household Income:			\$36,500.00

APPENDIX 3-D-2

CALAVERAS COUNTY WATER DISTRICT

Feasibility Study for Vallecito/Douglas Flat Reservoir

CALAVERAS COUNTY WATER DISTRICT

FEASIBILITY STUDY FOR VALLECITO/DOUGLAS FLAT RESERVOIR

December 2007

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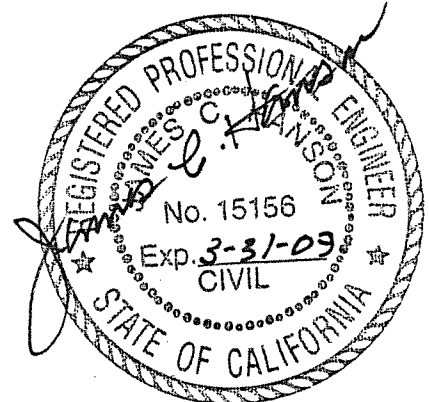


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APPENDICES

APPENDIX A	Geotechnical Memorandum
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INTRODUCTION

Calaveras County Water District (CCWD) is considering the construction of a Water Storage Reservoir near the existing Vallecito Treatment Plant. By agreement dated March 28, 2007, CCWD authorized James C. Hanson, Consulting Civil Engineer, to perform a feasibility level evaluation of reservoir alternatives of capacities sufficient to serve the proposed growth of the Vallecito and Douglas Flat communities. The purpose of this level of study was to identify alternatives and prepare feasibility level cost estimates. The scope of the evaluation consisted of an initial conceptual reservoir design, site reconnaissance survey, preparation of a geotechnical evaluation for the Vallecito/Douglas Flat site, refinement of evaluation alternatives in consultation with CCWD staff, preparation of preliminary reservoir designs, estimates of material quantities, and preparation of this report.

II. PROJECT ALTERNATIVES

A. Existing Site and Design Conditions

The proposed site for the construction of the Vallecito/Douglas Flat Reservoir was evaluated under 2 scenarios. The first scenario (Scenario A) considers 2 alternatives for a project located outside of the estimated boundary for a high-voltage power-line easement, and the second scenario (Scenario B) considers 2 alternatives for a project located partially within the estimated boundary for a high-voltage power-line easement. From a geotechnical standpoint both of the proposed scenarios for the Vallecito/Douglas Flat Reservoir have been determined suitable for reservoir construction. See the Geotechnical Memorandum by Blackburn Consulting dated May 24, 2007, attached hereto in Appendix A of this report.

The dam forming the proposed reservoir would be a homogeneous earthen embankment with appropriate cutoff, having a crest width of 16 feet, and upstream and downstream slopes of 3H to 1V and 2H to 1V, respectively. A foundation blanket drain will be located under a portion of the embankment downstream from the cut-off trench. Releases from the reservoir will be made by means of an 18" diameter concrete encased conduit, controlled by a horizontally mounted and hydraulically actuated slide gate.

The spillway for this project will consist of a concrete drop inlet structure with a 36" RCP conduit through the dam embankment. The 36" RCP will discharge into a manhole which will combine the discharge accruing from the reservoir diversion ditch with the reservoir spillway discharge. A 36" HDPE conduit will extend to the energy dissipation basin as shown in Figures II-1 through II-4. The diversion ditches around the perimeter of the reservoir area discharge through 18" culverts.

II. PROJECT ALTERNATIVES

A. Existing Site and Design Conditions

The proposed site for the construction of the Vallecito/Douglas Flat Reservoir was evaluated under 2 scenarios. The first scenario (Scenario A) considers 2 alternatives for a project located outside of the approximate boundary of a high-voltage power-line easement, and the second scenario (Scenario B) considers 2 alternatives for a project located partially within the approximate boundary of a high-voltage power-line easement. From a geotechnical standpoint both of the proposed scenarios for the Vallecito/Douglas Flat Reservoir have been determined suitable for reservoir construction. See the Geotechnical Memorandum by Blackburn Consulting dated May 24, 2007, attached hereto in Appendix A of this report.

The dam forming the proposed reservoir would be a homogeneous earthen embankment with appropriate cutoff, having a crest width of 16 feet, and upstream and downstream slopes of 3H to 1V and 2H to 1V, respectively. A foundation blanket drain will be located under a portion of the embankment downstream from the cut-off trench. Releases from the reservoir will be made by means of an 18" diameter concrete encased conduit, controlled by a horizontally mounted and hydraulically actuated slide gate.

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B. Alternative Design Summary

For each scenario 2 alternatives were analyzed at different storage capacities, see Figures II-1 through II-4 on the following pages. Table II-1 below summarizes the storage elevations, operational capacities based on an operational storage elevation, outlet invert elevation, and the minimum area to be disturbed by the respective alternative.

Table II-1: Alternative Design Summary Table

Scenario	Alternative	Maximum Storage Elevation	Operational Storage Elevation	Operational Capacity (ac-ft)	Operational Capacity (MG)	Outlet Intake Elevation	Footprint of Disturbed Area
A	1	1891.0	1889.0	47	15.3	1860.0	5.2
A	2	1900.0	1898.0	86	28.0	1860.0	7.2
B	1	1886.0	1884.0	46	15.0	1865.0	6.0
B	2	1894.0	1892.0	89	29.0	1860.0	7.9

Maximum Storage Elevations were determined using 4 feet of total freeboard. Operational Capacity was determined based on 6 feet of operational freeboard. DSOD requires a concrete encased outlet conduit with a control gate invert elevation that allows the release of not less than two-thirds of the total storage volume and a diameter sufficient to allow one-half of the total storage volume to be released in seven days or less. Since this project is for the proposed construction of a new reservoir, the outlet will be placed at the bottom of the reservoir to enable the release of the total reservoir volume.

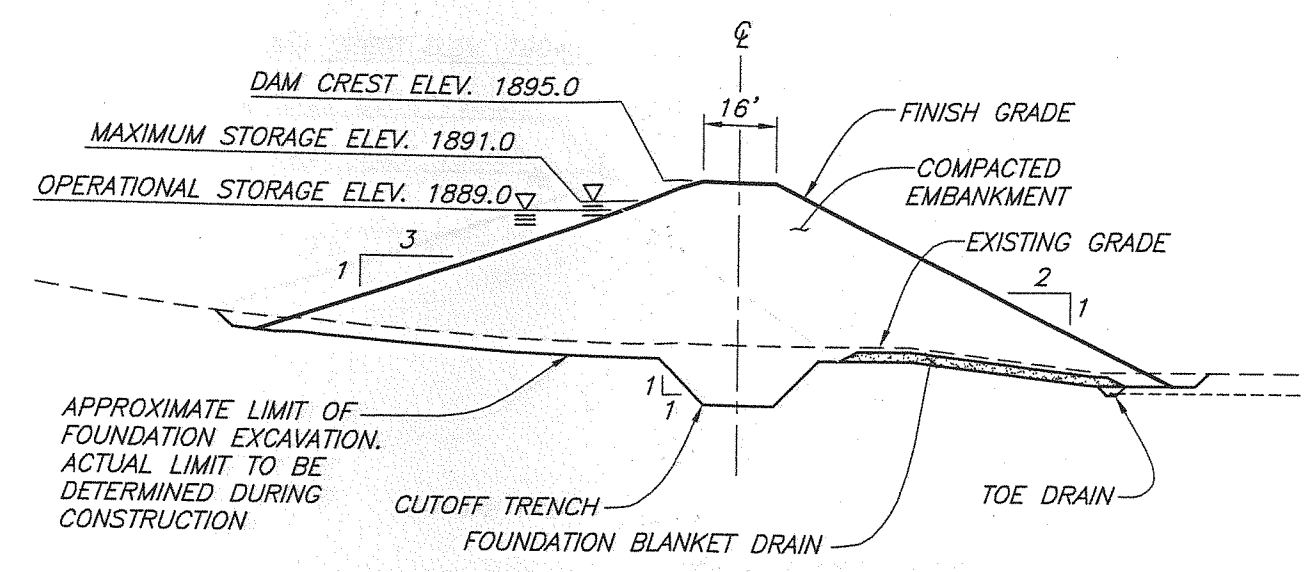
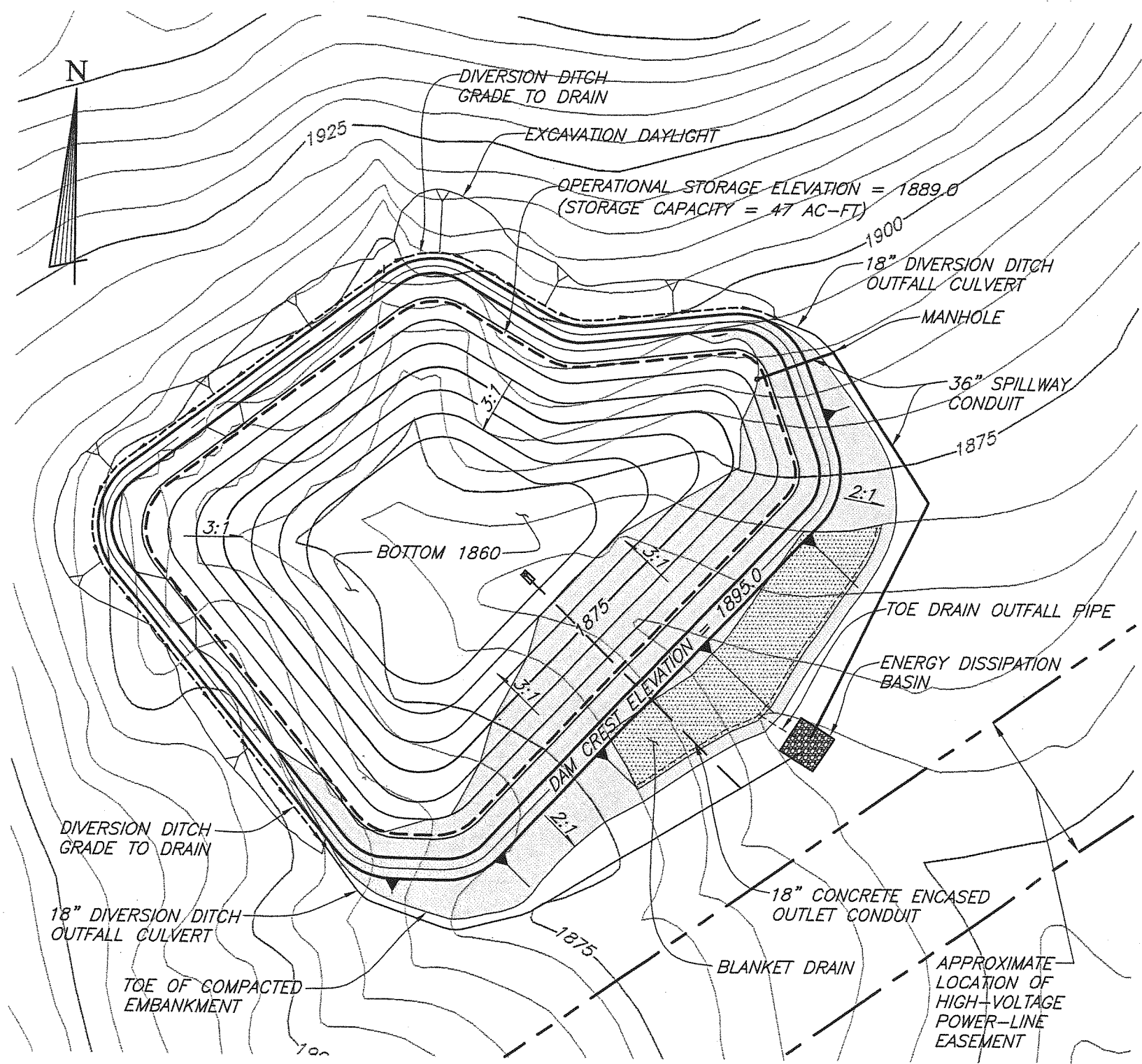
Figures

Figure II-1: Plan of Scenario A - Alternative 1

Figure II-2: Plan of Scenario A - Alternative 2

Figure II-3: Plan of Scenario B - Alternative 1

Figure II-4: Plan of Scenario B - Alternative 2

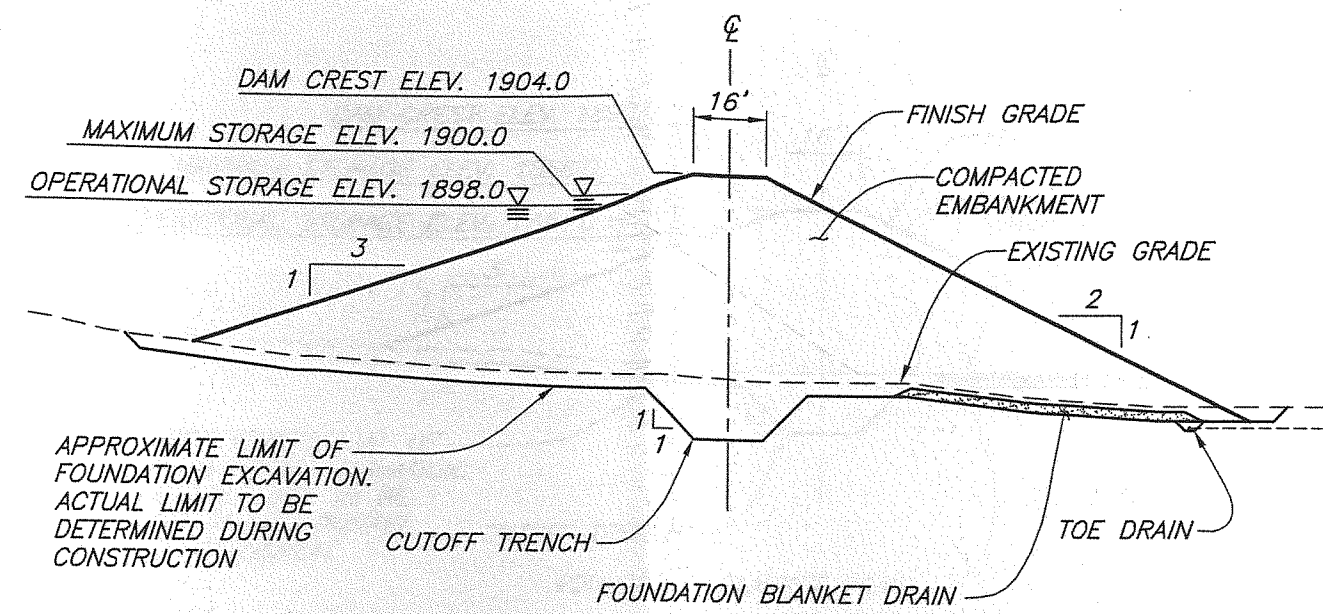
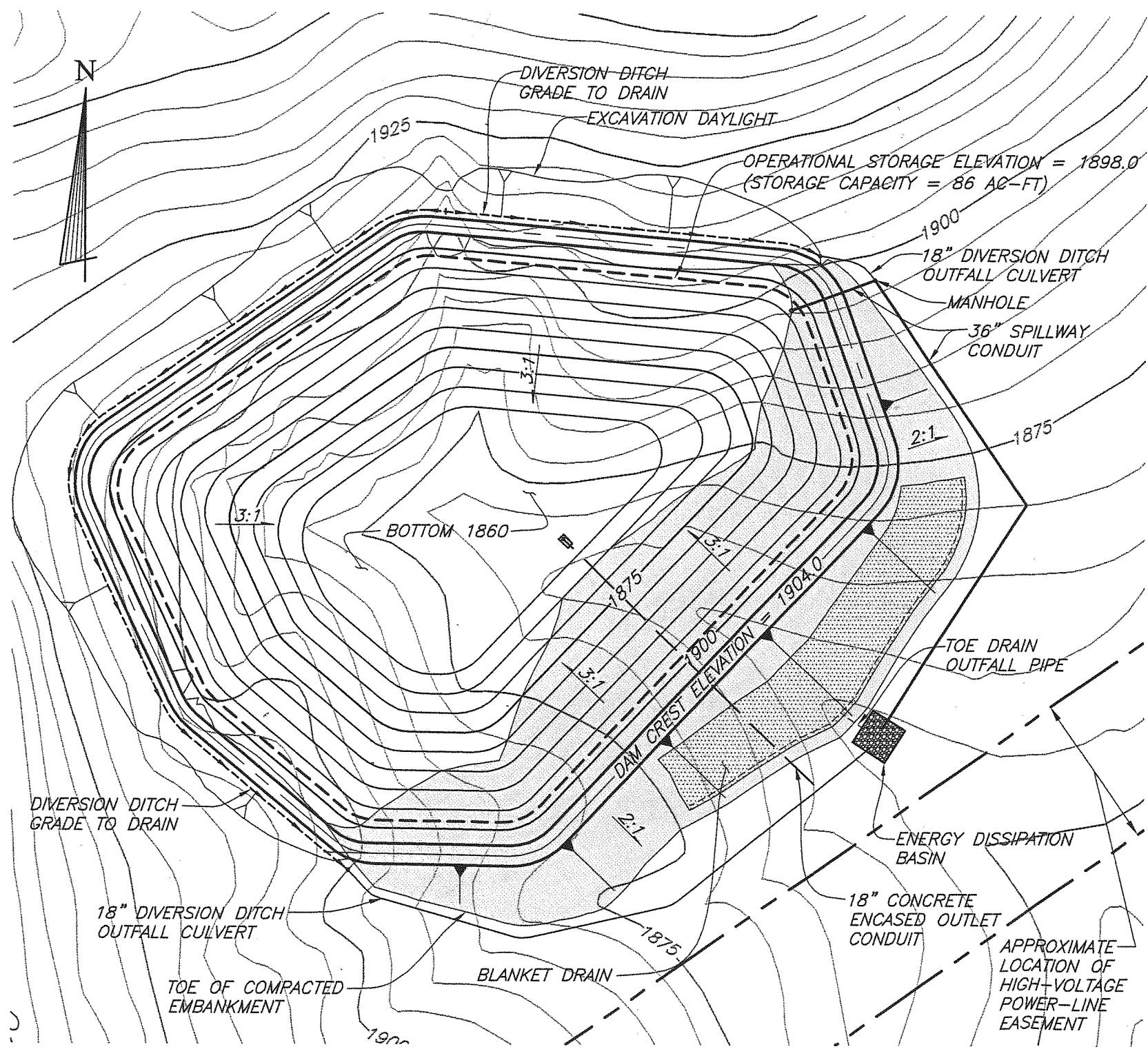


CALAVERAS COUNTY WATER DISTRICT

CONCEPTUAL PLAN FOR VALLECITO/DOUGLAS FLAT RESERVOIR

SCENARIO A - ALTERNATIVE 1

JH
JAMES C. HANSON
CONSULTING CIVIL ENGINEER
A CORPORATION

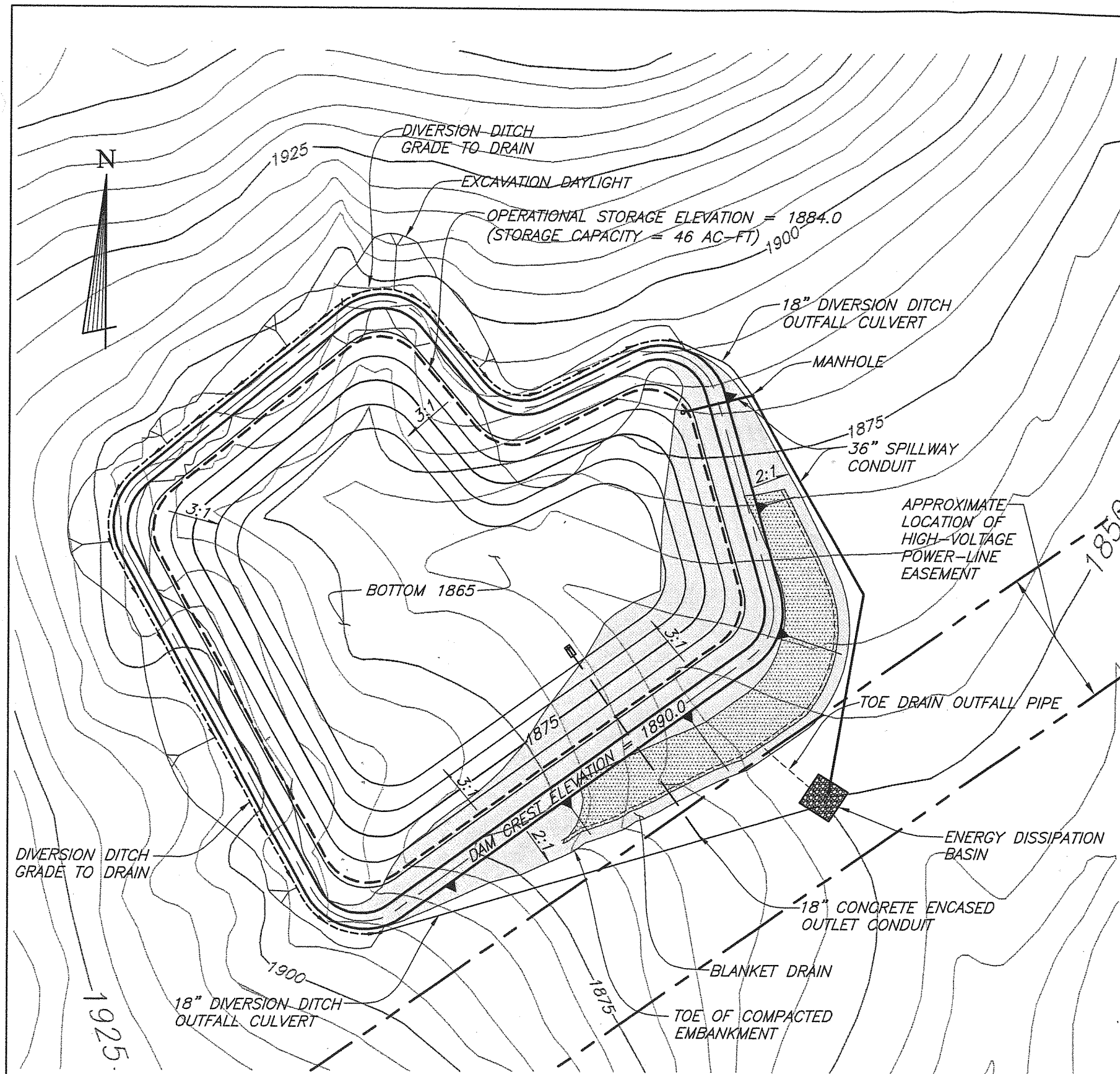


CALAVERAS COUNTY WATER DISTRICT

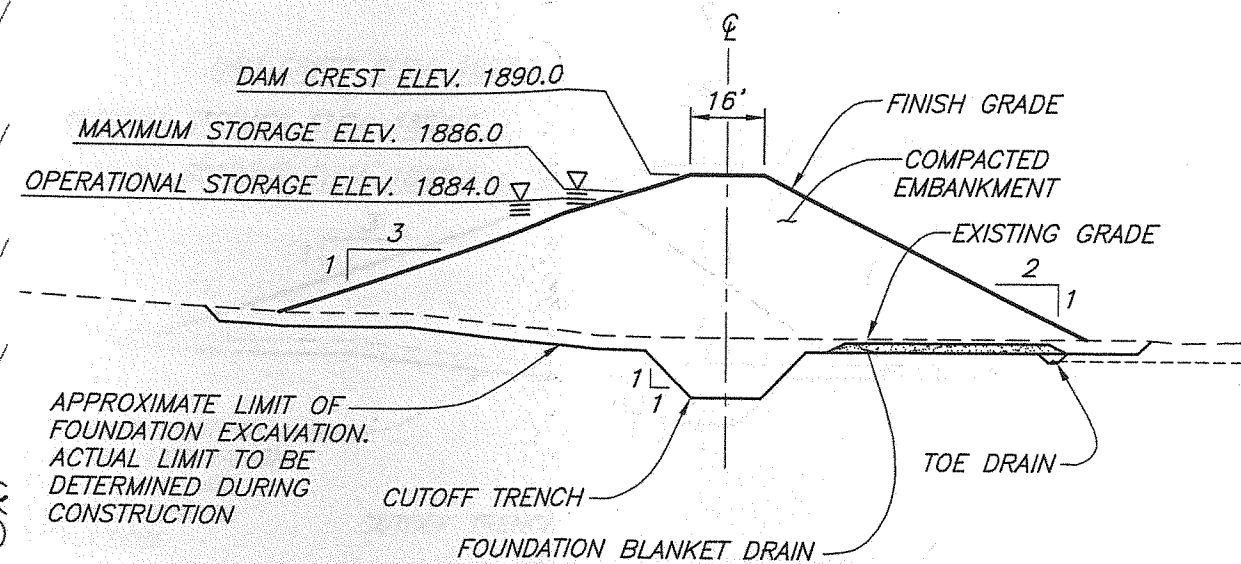
CONCEPTUAL PLAN FOR VALLECITO/DOUGLAS FLAT RESERVOIR

SCENARIO A - ALTERNATIVE 2

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CONSULTING CIVIL ENGINEER
A CORPORATION



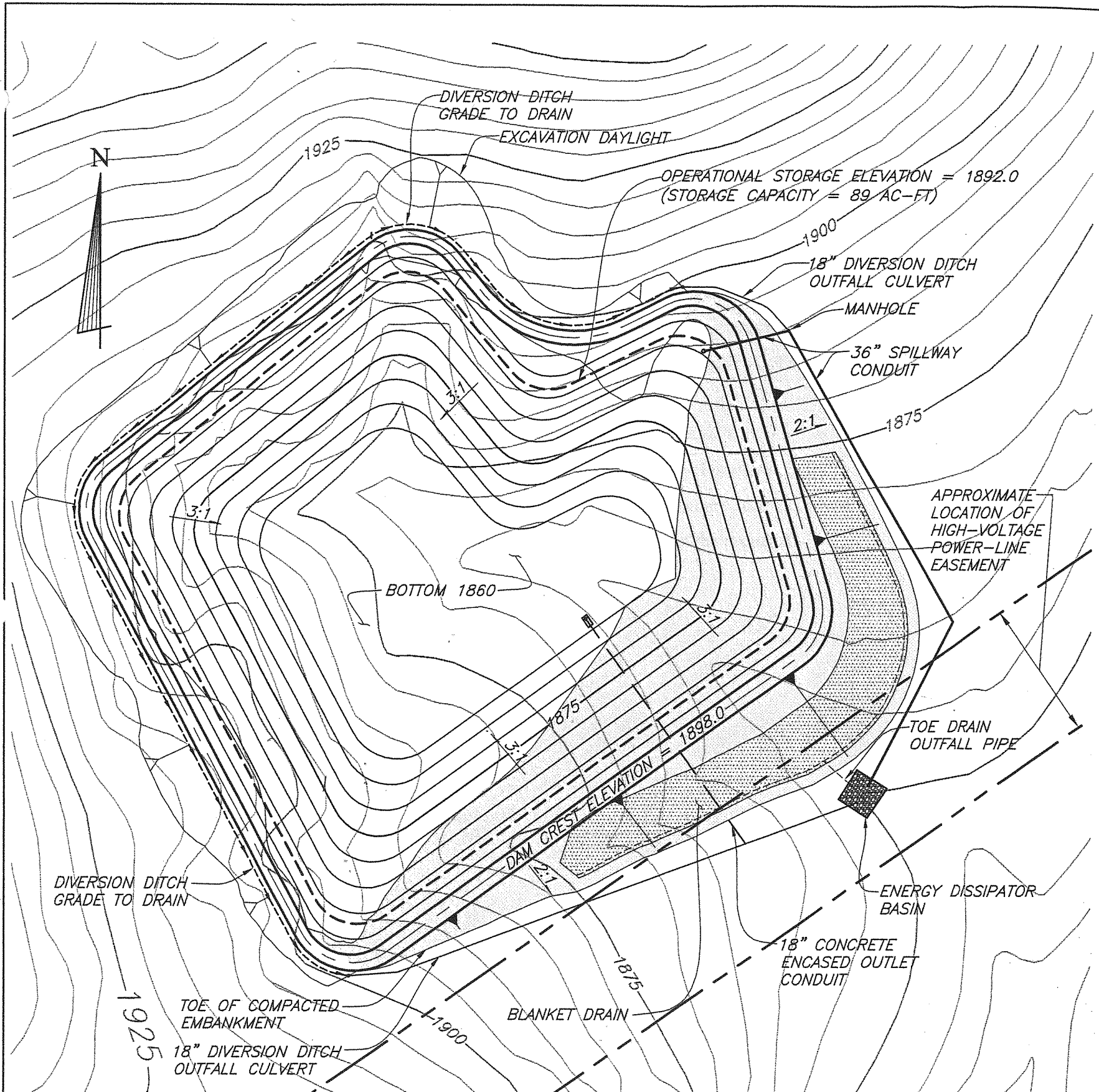
PLAN
SCALE: 1" = 100'



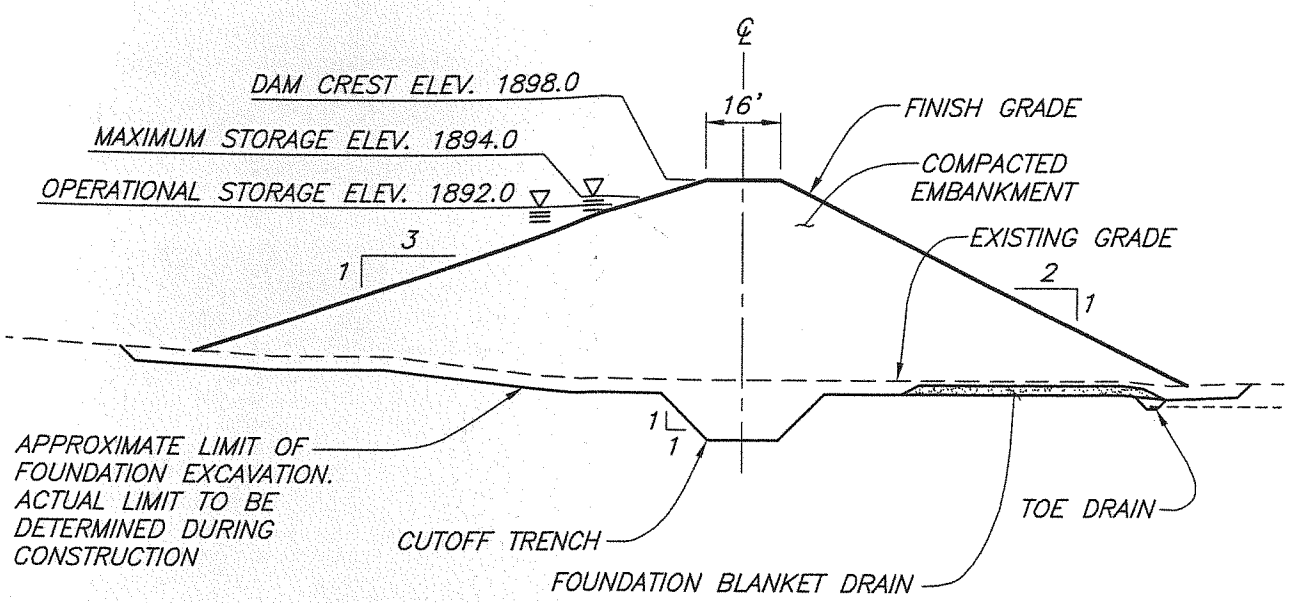
MAXIMUM SECTION
SCALE: 1" = 40'

CALAVERAS COUNTY WATER DISTRICT
CONCEPTUAL PLAN FOR VALLECITO/DOUGLAS FLAT RESERVOIR
SCENARIO B - ALTERNATIVE 1

JH
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A CORPORATION



PLAN
SCALE: 1' = 100'



MAXIMUM SECTION
SCALE: 1' = 40'

CALAVERAS COUNTY WATER DISTRICT
CONCEPTUAL PLAN FOR VALLECITO/DOUGLAS FLAT RESERVOIR
SCENARIO B - ALTERNATIVE 2



III. GEOTECHNICAL EVALUATION

The geotechnical evaluation was conducted by Blackburn Consulting, and consisted of a review of published geologic/geotechnical information and design documents and construction records for the original project, a site reconnaissance by an engineering geologist and an exploration program consisting of backhoe test pits. The results of this study are contained in Blackburn's Geotechnical Memorandum, a copy of which is provided in Appendix A of this report.

The report concludes that proposed construction of a reservoir facility on this site is feasible from an engineering standpoint and that the site contains native materials that are suitable for use as embankment fill. This report is sufficient in scope and content to support the required application to DSOD for the selected alternative.

IV. COST ESTIMATES

Estimated total project cost refers to the summation of the estimated direct construction costs, contingencies and engineering and administration. The estimated total project costs for the proposed enlargement alternatives are summarized as follows in Table IV-1 and itemized costs are shown in Tables IV-2 through IV-5.

Table IV-1: Cost Feasibility Summary

<u>Alternative</u>	<u>Estimated Construction Cost</u>	<u>Estimated Cost per Acre-Foot of Operational Storage</u>
Scenario A - Alternative 1 (47 ac-ft)	\$699,400	\$14,900
Scenario A - Alternative 2 (86 ac-ft)	\$965,900	\$11,200
Scenario B - Alternative 1 (46 ac-ft)	\$744,500	\$16,200
Scenario B - Alternative 2 (89 ac-ft)	\$1,000,000	\$11,200

As shown on Tables IV-2 through IV-5, a 20 percent contingency factor was applied to the estimated direct construction costs. Engineering and administration were assumed at a percentage of the sum of the total direct construction cost plus contingencies, and includes engineering design, administration, construction inspection and construction management. No allowance has been made for costs of land acquisition, CEQA compliance, permitting (excepting Division of Safety of Dams), start-up costs or financing of construction capital.

Tables

- Table IV-2: Cost Estimate for Scenario A - Alternative 1
- Table IV-3: Cost Estimate for Scenario A - Alternative 2
- Table IV-4: Cost Estimate for Scenario B - Alternative 1
- Table IV-5: Cost Estimate for Scenario B - Alternative 2

Table IV-2: Cost Estimate for Scenario A - Alternative 1

Calaveras County Water District
Cost Estimate for Vallecito/Douglas Flat

<u>35 ft Reservoir - 47 ac-ft</u>				
<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Cost</u>
I. EARTHWORK				
A. Clearing, Grubbing & Stripping	5.2	Acres	1,000.00	5,200
B. Embankment Foundation & Core Trench				
Excavation and Clean-up	14,900	C.Y.	3.50	52,200
C. Embankment Fill - On-site Source (See Note 1)	51,000	C.Y.	3.00	153,000
D. 2' Thick Blanket Drain	1,000	C.Y.	60.00	60,000
II. OUTLET CONDUIT				
A. 18" dia. Concrete Encased Pipe	230	L.F.	400.00	92,000
B. Gate Controls and Trash Rack	1	Job	Lump Sum	20,000
III. SPILLWAY				
A. 36" dia. Concrete Encased Spillway Conduit	50	L.F.	500.00	25,000
B. 36" dia. Spillway Conduit	350	L.F.	80.00	28,000
IV. MISCELLANEOUS				
A. Diversion Ditch	1,000	L.F.	5.00	5,000 *
B. 18" dia. Outfall Culvert	480	L.F.	50.00	24,000 *
C. Perforated Toe Drain	300	L.F.	35.00	10,500
D. Rip Rap	30	Tons	50.00	1,500
E. Hydroseeding	6,900	S.Y.	1.00	6,900
F. Mobilization (Assumed at 3% of Total)	1	Job	Lump Sum	14,000
TOTAL DIRECT CONSTRUCTION COST				\$497,300
CONTINGENCIES @ 20%				99,500
SUBTOTAL				\$596,800
ENGINEERING, INSPECTION AND ADMINISTRATION @ 15%				90,000
SUBTOTAL				\$686,800
SUBTOTAL LESS ITEMS NOT INCLUDED FOR DSOD PROJECT (Items not included for DSOD project fee denoted by ' * ')				
Subtotal for DSOD Fee Calculation:				\$658,000
DIVISION OF SAFETY OF DAMS FEE				16,000
TOTAL ESTIMATED COST				<u>\$702,800</u>

Notes:

1. Includes excess cut from spillway excavation, material removed in connection with foundation preparation and surplus cut from the diversion ditch.

Table IV-3: Cost Estimate for Scenario A - Alternative 2

Calaveras County Water District
Cost Estimate for Vallecito/Douglas Flat

<u>45 ft Reservoir - 86 ac-ft</u>				
<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Cost</u>
I. EARTHWORK				
A. Clearing, Grubbing & Stripping	7.2	Acres	1,000.00	7,200
B. Embankment Foundation & Core Trench				
Excavation and Clean-up	19,900	C.Y.	3.50	69,700
C. Embankment Fill - On-site Source (See Note 1)	85,900	C.Y.	3.00	257,700
D. 2' Thick Blanket Drain	1,300	C.Y.	60.00	78,000
II. OUTLET CONDUIT				
A. 18" dia. Concrete Encased Pipe	300	L.F.	400.00	120,000
B. Gate Controls and Trash Rack	1	Job	Lump Sum	20,000
III. SPILLWAY				
A. 36" dia. Concrete Encased Spillway Conduit	60	L.F.	500.00	30,000
B. 36" dia. Spillway Conduit	430	L.F.	80.00	34,400
IV. MISCELLANEOUS				
A. Diversion Ditch	1,100	L.F.	5.00	5,500 *
B. 18" dia. Outfall Culvert	520	L.F.	50.00	26,000 *
C. Perforated Toe Drain	350	L.F.	35.00	12,300
D. Rip Rap	30	Tons	50.00	1,500
E. Hydroseeding	10,600	S.Y.	1.00	10,600
F. Mobilization (Assumed at 3% of Total)	1	Job	Lump Sum	20,000
TOTAL DIRECT CONSTRUCTION COST				\$692,900
CONTINGENCIES @ 20%				138,600
SUBTOTAL				\$831,500
ENGINEERING, INSPECTION AND ADMINISTRATION @ 15%				125,000
SUBTOTAL				\$956,500
SUBTOTAL LESS ITEMS NOT INCLUDED FOR DSOD PROJECT (Items not included for DSOD project fee denoted by ' * ')				
			Subtotal for DSOD Fee Calculation:	\$925,000
DIVISION OF SAFETY OF DAMS FEE				22,000
TOTAL ESTIMATED COST				<u>\$978,500</u>

Notes:

1. Includes excess cut from spillway excavation, material removed in connection with foundation preparation and surplus cut from the diversion ditch.

Table IV-4: Cost Estimate for Scenario B - Alternative 1

Calaveras County Water District
Cost Estimate for Vallecito/Douglas Flat

30 ft Reservoir - 46 ac-ft				
<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Cost</u>
I. EARTHWORK				
A. Clearing, Grubbing & Stripping	6.0	Acres	1,000.00	6,000
B. Embankment Foundation & Core Trench				
Excavation and Clean-up	15,700	C.Y.	3.50	55,000
C. Embankment Fill - On-site Source (See Note 1)	54,300	C.Y.	3.00	162,900
D. 2' Thick Blanket Drain	1,260	C.Y.	60.00	75,600
II. OUTLET CONDUIT				
A. 18" dia. Concrete Encased Pipe	200	L.F.	400.00	80,000
B. Gate Controls and Trash Rack	1	Job	Lump Sum	20,000
III. SPILLWAY				
A. 36" dia. Concrete Encased Spillway Conduit	60	L.F.	500.00	30,000
B. 36" dia. Spillway Conduit	370	L.F.	80.00	29,600
IV. MISCELLANEOUS				
A. Diversion Ditch	1,080	L.F.	5.00	5,400 *
B. 18" dia. Outfall Culvert	480	L.F.	50.00	24,000 *
C. Perforated Toe Drain	500	L.F.	35.00	17,500
D. Rip Rap	30	Tons	50.00	1,500
E. Hydroseeding	7,600	S.Y.	1.00	7,600
F. Mobilization (Assumed at 3% of Total)	1	Job	Lump Sum	15,000
TOTAL DIRECT CONSTRUCTION COST				\$530,100
CONTINGENCIES @ 20%				106,000
SUBTOTAL				\$636,100
ENGINEERING, INSPECTION AND ADMINISTRATION @ 15%				95,000
SUBTOTAL				\$731,100
SUBTOTAL LESS ITEMS NOT INCLUDED FOR DSOD PROJECT (Items not included for DSOD project fee denoted by ' * ')				
			Subtotal for DSOD Fee Calculation:	\$702,000
DIVISION OF SAFETY OF DAMS FEE				17,000
TOTAL ESTIMATED COST				<u>\$748,100</u>

Notes:

1. Includes excess cut from spillway excavation, material removed in connection with foundation preparation and surplus cut from the diversion ditch.

Table IV-5: Cost Estimate for Scenario B - Alternative 2

Calaveras County Water District
Cost Estimate for Vallecito/Douglas Flat

<u>40 ft Reservoir - 89 ac-ft</u>				
<u>Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Cost</u>
I. EARTHWORK				
A. Clearing, Grubbing & Stripping	7.9	Acres	1,000.00	7,900
B. Embankment Foundation & Core Trench				
Excavation and Clean-up	20,500	C.Y.	3.50	71,800
C. Embankment Fill - On-site Source (See Note 1)	86,400	C.Y.	3.00	259,200
D. 2' Thick Blanket Drain	1,750	C.Y.	60.00	105,000
II. OUTLET CONDUIT				
A. 18" dia. Concrete Encased Pipe	240	L.F.	400.00	96,000
B. Gate Controls and Trash Rack	1	Job	Lump Sum	20,000
III. SPILLWAY				
A. 36" dia. Concrete Encased Spillway Conduit	70	L.F.	500.00	35,000
B. 36" dia. Spillway Conduit	450	L.F.	80.00	36,000
IV. MISCELLANEOUS				
A. Diversion Ditch	1,140	L.F.	5.00	5,700 *
B. 18" dia. Outfall Culvert	570	L.F.	50.00	28,500 *
C. Perforated Toe Drain	550	L.F.	35.00	19,300
D. Rip Rap	30	Tons	50.00	1,500
E. Hydroseeding	10,400	S.Y.	1.00	10,400
F. Mobilization (Assumed at 3% of Total)	1	Job	Lump Sum	21,000
TOTAL DIRECT CONSTRUCTION COST				\$717,300
CONTINGENCIES @ 20%				143,500
SUBTOTAL				\$860,800
ENGINEERING, INSPECTION AND ADMINISTRATION @ 15%				129,000
SUBTOTAL				\$989,800
SUBTOTAL LESS ITEMS NOT INCLUDED FOR DSOD PROJECT (Items not included for DSOD project fee denoted by ' * ')				
			Subtotal for DSOD Fee Calculation:	\$956,000
DIVISION OF SAFETY OF DAMS FEE				22,000
TOTAL ESTIMATED COST				<u>\$1,011,800</u>

Notes:

1. Includes excess cut from spillway excavation, material removed in connection with foundation preparation and surplus cut from the diversion ditch.

Calaveras County Water District
Feasibility Study for Vallecito/Douglas Flat Reservoir

APPENDIX A

Auburn Office:

11521 Blocker Drive, Suite 110 • Auburn, CA 95603
(530) 887-1494 • Fax (530) 887-1495



Modesto Office: (209) 522-6273
West Sacramento Office: (916) 375-8706

Geotechnical • Construction Services • Forensics

BCI File No. 868.2
May 24, 2007

Mr. David Lounsbury
Hanson Engineering
444 N. Third Street, Suite 400
Sacramento, CA 95814

Subject: **Geotechnical Memorandum**
Vallecito Storage Reservoir, Redd Property
Calaveras County Water District

Dear Dave:

Blackburn Consulting (BCI) completed a preliminary geotechnical assessment of the above site for a proposed wastewater storage reservoir. This site is identified as the "Redd Property", located approximately ½-mile south of the existing Vallecito wastewater treatment plant. We show the site location on Figure 1.

The purpose of this evaluation is to assess the general feasibility of constructing an effluent storage reservoir within a tributary drainage to Little Dry Creek. Site elevations range from about 2000 ft at the northwest side, near a saddle between two hills, to about 1850 ft near the confluence with Little Dry Creek. The drainage area and other swales at the property contain mounds of soil with cobbles, indicating surface disturbance likely associated with past placer mining. Electrical transmission lines cross the site near Little Dry Creek at the southeast end of the property. We include site photos in Appendix B.

Geologic Setting

Published geologic mapping¹ shows the site is underlain by Tertiary-age sediments of the Valley Springs Formation and "auriferous gravels". The Valley Springs Formation is predominately rhyolitic tuff, sandstone, claystone and conglomerate. The auriferous gravels are older river channel and bench gravels, cobbles and boulders; these deposits were extensively mined for placer gold in the 1800's. We show the regional site geology on Figure 2.

Findings

We excavated seven test pits within the site to provide a preliminary evaluation of materials and conditions. We show the locations of the pits on Figure 3, and the detailed logs in Appendix A. We summarize our findings as follows:

¹ Wagner, D.L., et al., 1981, *Geologic Map of the Sacramento Quadrangle, California*, Map No. 1A

1. We encountered light yellowish-brown to white sandstone/claystone in each of the test pits, underlying a surface soil cover 1-4 ft thick. The sandstone/claystone is weakly to strongly cemented with a siliceous matrix. The digging was generally easy to moderate with a Holt 420D backhoe equipped with an 18 inch wide digging bucket, except in TP-2 where we encountered very hard digging at depth 3.5 ft in highly cemented materials. We interpret the sandstone as Valley Springs Formation; most of these materials broke into fragments of 6 inches or less when excavated. The maximum depth of excavation was about 8 ft.
2. The soil cover (uppermost 1-4 ft) is comprised of soft, dark brown, sandy clay with scattered roots, gravel and cobbles. We interpret these materials as topsoil, channel alluvium and mine spoils.
3. The test pits were dry, except for minor seepage in TP-6 at depth 5.5 ft. The central drainage area contained some standing surface water, likely "perched" over the cemented, low permeability sandstone/claystone.
4. We observed outcrops of relatively hard, metamorphic rock at the north side of the reservoir area and along the ridge near the transmission towers. We did not encounter this rock in the test pits, but these rock areas may be difficult to excavate and generate boulders several feet in dimension. We show the general area of these outcrops on Figure 3.

Laboratory Testing

We conducted laboratory tests on a composite sample of likely embankment material, obtained from Test Pits 3, 4 and 5. These tests show 24% passing No. 200 sieve, maximum dry density 82 pcf, and optimum moisture 32%. Results of remolded shear strength tests show soil friction angle of 32° and cohesion of 448 psf. We include the laboratory test reports in Appendix A.

Preliminary Conclusions

Based on these preliminary data, we consider the site feasible for reservoir construction. We did not observe evidence of major geologic hazards, such as landsliding, faulting or liquefiable soils.

We expect the weathered sandstone/claystone to generally break down into silty and clayey sand, with cemented fragments about 6-12 inches in maximum dimension. We consider these materials excavatable to a depth of 10+ ft with scrapers and similar earth-moving equipment, and suitable for use as general embankment fill. Locally, highly cemented materials of the Valley Springs Formation (e.g., TP-2 area) may require ripping. The areas with outcrop of hard, metamorphic rock may require special excavation and placement/disposal (such as rip-rap).

Our preliminary laboratory tests indicate the native sandstone/claystone is generally suitable for use as embankment fill. These materials have substantial in-situ and remolded strength, although they are relatively lightweight (likely indicative of a volcanic origin). We consider the native materials to have low hydraulic conductivity, both in-place and remolded.

Limitations

This evaluation is preliminary. Further study is required for design of a specific facility and will include test borings, laboratory testing, and detailed materials assessment for embankment fill, foundation support, underseepage cutoff, and reservoir leakage potential.

BCI based this report on the current site conditions. We assume the soil and groundwater conditions are representative of the subsurface conditions on the site. Actual conditions between the trenches could be different.

Please call if you have any questions on this memorandum, or the attached data.

Sincerely,

BLACKBURN CONSULTING



Rick Sowers, P.E., C.E.G.
Principal
Senior Project Manager

Reviewed by:



Patrick Fischer, C.E.G.
Principal
Senior Engineering Geologist

Attached: **Figures** Figure 1: Vicinity Map
 Figure 2: Regional Geologic Map
 Figure 3: Site Plan

Appendix A Test Pit Logs
 Test Pit Legend
 Laboratory Test Results

Appendix B Site Photos

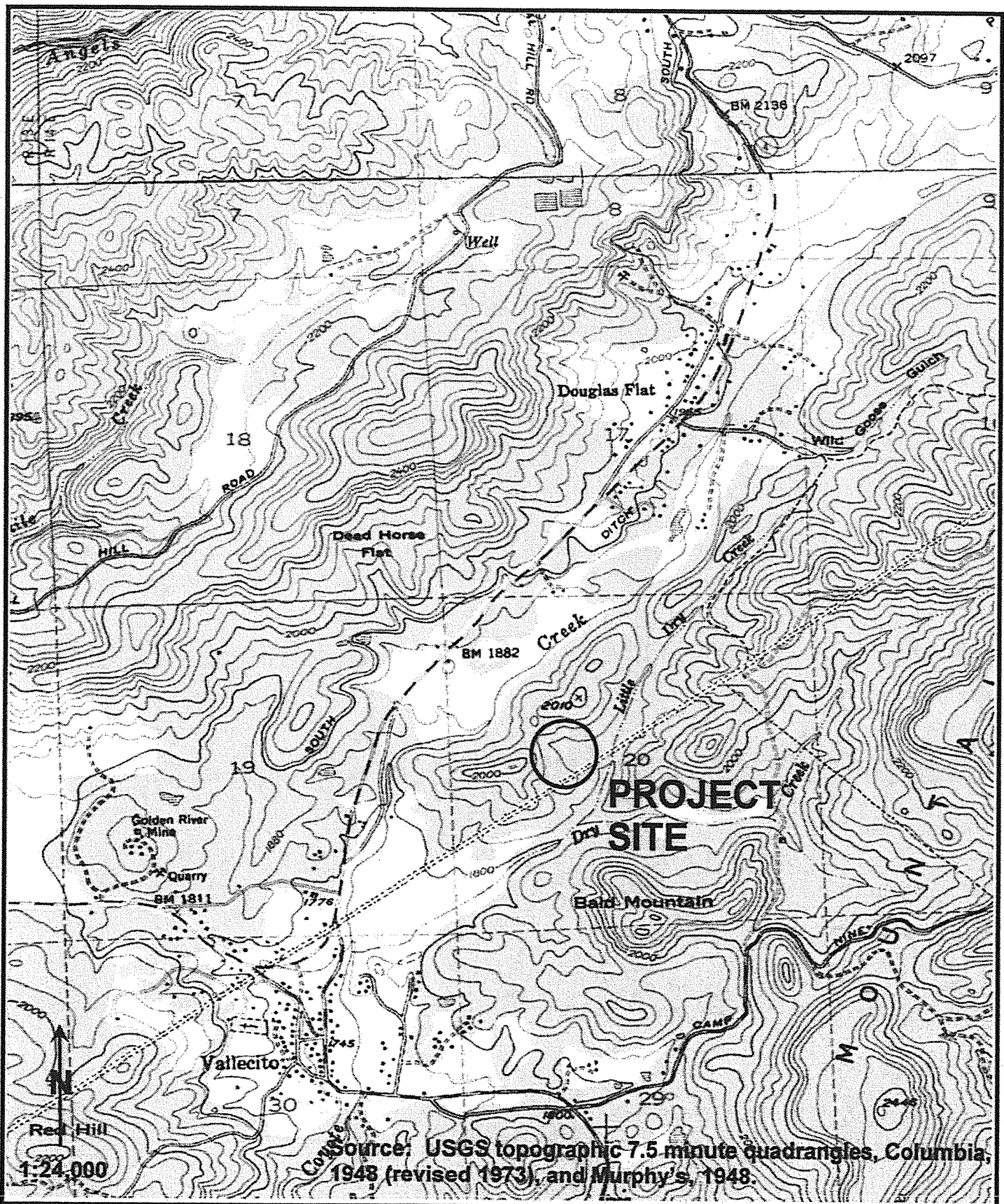


FIGURES

Figure 1 – Vicinity Map

Figure 2 – Regional Geologic Map

Figure 3 – Site Plan



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consulting

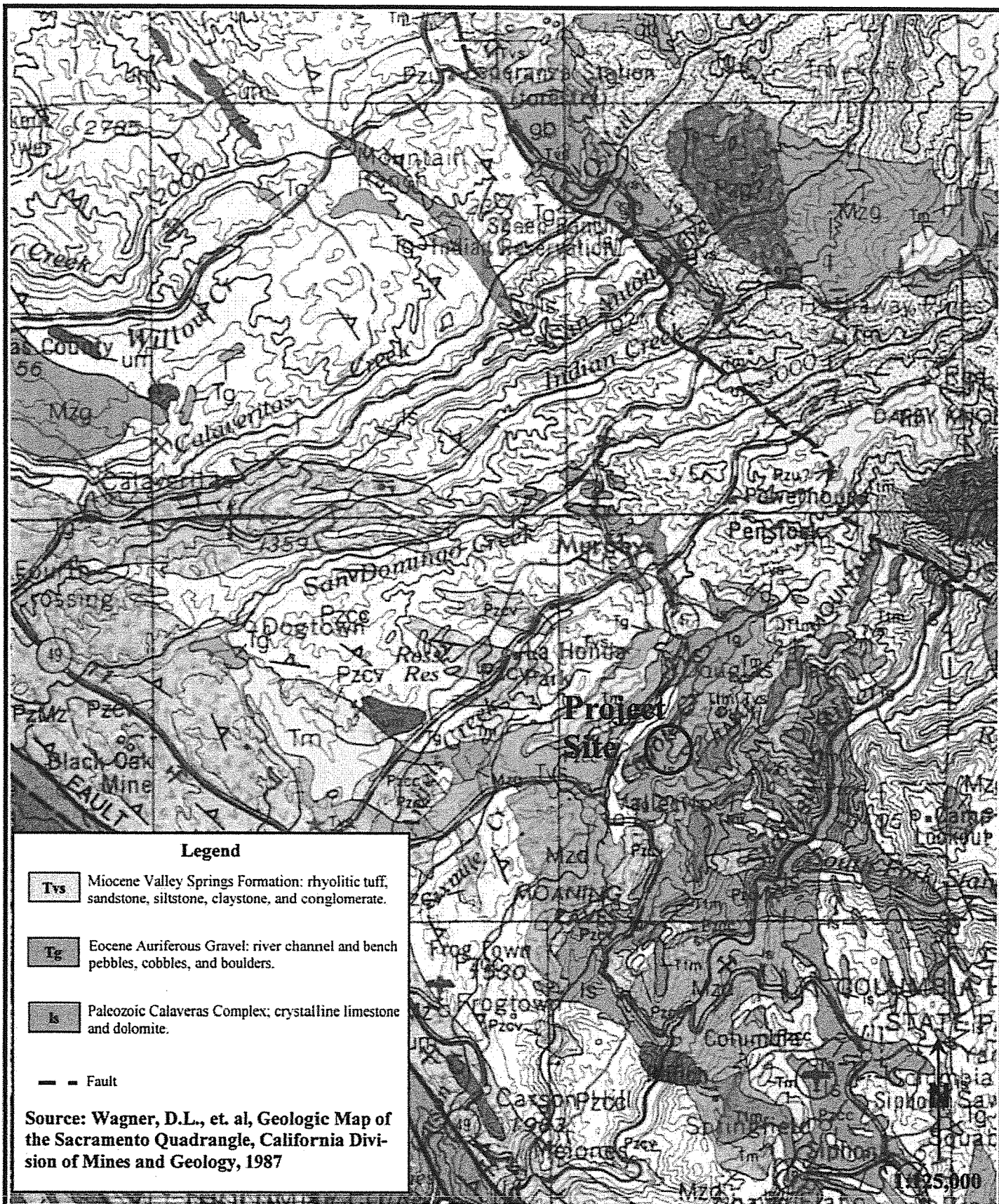
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(530) 887-1495-Fax
www.blackburnconsulting.com

VICINITY MAP Vallecito WWTP — "Redd Site" Calaveras County, CA

Job No. 868.2

May. 2007

Figure 1



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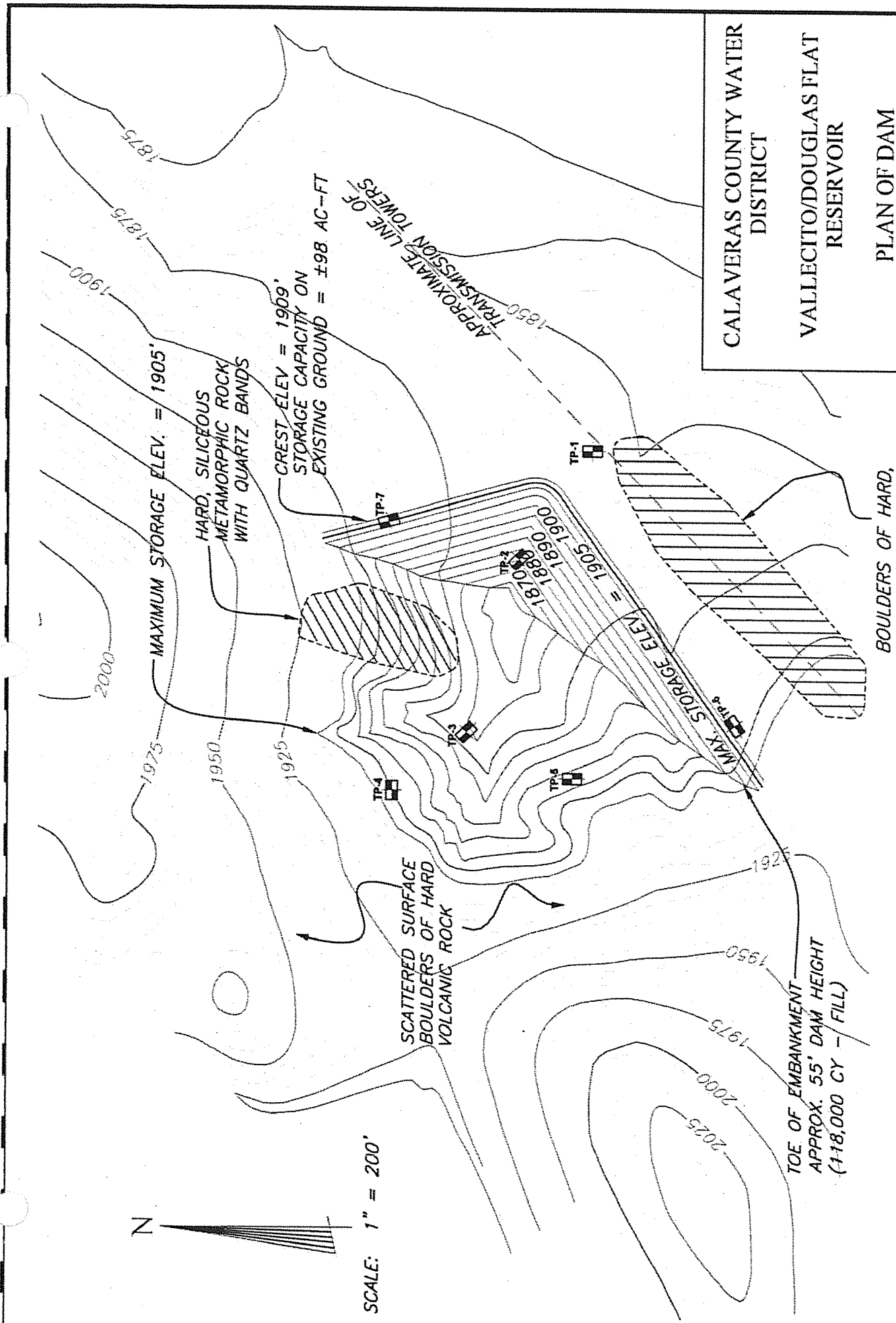
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(530) 887-1495-Fax
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REGIONAL GEOLOGIC MAP
Vallecito Reservoir — "Redd Site"
Calaveras County, CA

Job: 868.2

May 2007

Figure 2



CALAVERAS COUNTY WATER DISTRICT
 VALLECITO/DOUGLAS FLAT RESERVOIR
 PLAN OF DAM

JH
 JAMES C. HANSON
 CONSULTING CIVIL ENGINEER
 A CORPORATION

APRIL 2007

LEGEND

TP-1 Location Test Trenches

SITE PLAN
File No. 868.2
Figure 3

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 Auburn, CA 95603
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 Fax (530) 887-1495
 www.blackburnconsulting.com

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APPENDIX A

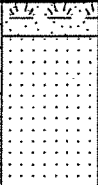
Test Pit Logs

Test Pit Legend

Laboratory Test Results

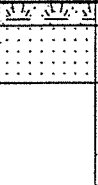
LOG OF TEST PIT TP-01

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1855.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
5		Sandy CLAY (CL); soft, dark brown, moist. SANDSTONE/CLAYSTONE; light yellowish-brown to white, moderately weathered, soft, with weakly cemented siliceous matrix. Scattered cobbles to about 4 inch diameter below depth 5 ft, with increasing cobbles below depth 7 ft. Moderate digging to depth 8 ft; no refusal. Dry.					
10		Bottom of Test Pit - 8 feet No groundwater or seepage encountered. Test pit backfilled 4/26/07.					
15							
20							

LOG OF TEST PIT TP-02

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1863.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
5		Sandy CLAY (CL); soft, dark brown, with roots, moist. SANDSTONE/CLAYSTONE; light yellowish-brown, moderately weathered, soft, with strongly cemented siliceous matrix. Very hard digging at depth 3.5 ft; refusal. Material breaks into fragments of 6 inch dimension or less. Dry. Bottom of Test Pit - 3.5 feet No groundwater or seepage encountered. Test pit backfilled 4/26/07.					
10							
15							
20							

TEST PIT LOG VALLECITO POND, GPJ BLACKBURN GDT 5/24/07


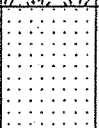



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Vallecito Reservoir - Redd Property
 Vallecito, CA





LOG OF TEST PIT TP-03

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1872.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
		Sandy CLAY (CL); soft, dark brown, moist.					
5		SANDSTONE/CLAYSTONE; light yellowish-brown, intensely weathered, soft, with weakly cemented siliceous matrix. Easy digging to depth 7.5 ft; no refusal. Material breaks easily into fragments of 4 inch dimension or less. Dry.					
10		Bottom of Test Pit - 7.5 feet No groundwater or seepage encountered. Test pit backfilled 4/26/07.					
15							
20							

LOG OF TEST PIT TP-04

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1900.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
		Sandy CLAY (CL); soft, dark brown, moist. Some scattered cobbles and small boulders.					
5		Clayey SAND (SC) with rounded gravel and cobbles; brown to orange-brown, firm, moist.					
		SANDSTONE/CLAYSTONE; light yellowish-brown, intensely weathered, soft, with weakly cemented siliceous matrix. Scattered fine gravel. Easy digging. Moist.					
10		Bottom of Test Pit - 8 feet No groundwater or seepage encountered. Test pit backfilled 4/26/07.					
15							
20							

TEST PIT LOG VALLECITO POND.GPJ BLACKBURN.GDT 5/24/07





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Vallecito Reservoir - Redd Property
 Vallecito, CA


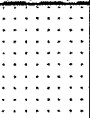
LOG OF TEST PIT TP-05

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1893.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
5		Sandy CLAY (CL), with roots; soft, dark brown, moist. SANDSTONE/CLAYSTONE; light yellowish-brown to white, moderately weathered, soft, with strong cemented siliceous matrix. Band of green horizontal stain at depth 2.7 ft, and local pink feldspar grains. Moderate to hard digging; Material breaks into fragments of 6 inch dimension or less.					
10		Bottom of Test Pit - 4.5 feet No groundwater or seepage encountered. Test pit backfilled 4/26/07.					
15							
20							

LOG OF TEST PIT TP-06

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1897.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
5		Sandy CLAY (CL), with rounded gravel and small cobbles; soft, dark brown and reddish brown, moist.					
5		SANDSTONE/CLAYSTONE; light yellowish-brown to brown, intensely weathered, soft, with weakly cemented siliceous matrix. Easy digging; Minor seepage within 6-inch layer of mottled orange brown and gray sandy clay at depth 5.5 ft.					
10		Bottom of Test Pit - 7.0 feet Minor seepage encountered at depth 5.5 ft. Test pit backfilled 4/26/07.					
15							

TEST PIT LOG VALLECITO POND GPJ BLACKBURN GDT 5/24/07


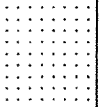


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Vallecito Reservoir - Redd Property
 Vallecito, CA

LOG OF TEST PIT TP-07

Date Excavated: 4/26/07 Logged by: RDS Depth to Water (ft): Dry
 Equipment: Holt 420D Backhoe Surface Elevation(ft): 1890.0 Time of Reading: 4/26/07

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE	HAND PEN. (tsf)	MOISTURE (%)	DRY UNIT WT. (pcf)	LAB TESTS
		Sandy CLAY (CL), with cobbles; soft, dark brown, moist.					
5		SANDSTONE/CLAYSTONE; white to light gray, moderately weathered, soft, with strong cemented siliceous matrix. Moderate to hard digging; Material breaks into fragments of 6 inch dimension or less. Dry.					
10		Bottom of Test Pit - 7.0 feet No groundwater or seepage encountered. Test pit backfilled 4/26/07.					
15							

TEST PIT LOG VALLECITO POND.GPJ BLACKBRN.GDT 5/24/07



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Vallecito Reservoir - Redd Property
 Vallecito, CA

UNIFIED SOIL CLASSIFICATION (ASTM D 2487-98)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	GRAPHIC SYMBOL	SOIL GROUP NAMES
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SCREEN	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS <5% FINES	Cu > 4 AND 1 < Cc < 3	GW		WELL-GRADED GRAVEL
			Cu < 4 AND/OR 1 > Cc > 3	GP		POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH	GM		SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC		CLAYEY GRAVEL
	SANDS <50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN SANDS <5% FINES	Cu > 6 AND 1 < Cc < 3	SW		WELL-GRADED SAND
			Cu < 6 AND/OR 1 > Cc > 3	SP		POORLY-GRADED SAND
		SANDS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM		SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC		CLAYEY SAND
FINE-GRAINED SOILS >50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	INORGANIC	PI > 7 AND PLOTS > "A" LINE	CL		LOW-PLASTICITY CLAY
			PI > 4 AND PLOTS < "A" LINE	ML		LOW-PLASTICITY SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL		ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT >50	INORGANIC	PI PLOTS > "A" LINE	CH		HIGH-PLASTICITY CLAY
			PI PLOTS < "A" LINE	MH		HIGH-PLASTICITY SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH		ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK COLOR, ORGANIC ODOR		PT		PEAT

NOTE: $C_u = D_{60}/D_{10}$ $C_c = (D_{30})^2 / (D_{10} + D_{60})$

BLOW COUNT: THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30" REQUIRED TO DRIVE THE SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE. THE NOTATION 50/4 INDICATES 4 INCHES OF PENETRATION ACHIEVED IN 50 BLOWS.

SAMPLE TYPES

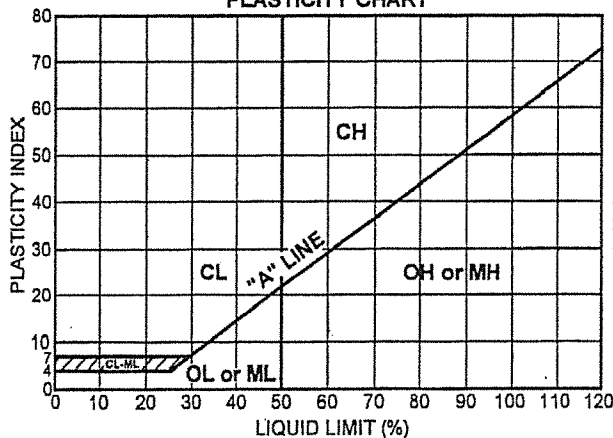


GRAB SAMPLE



BULK SAMPLE

PLASTICITY CHART



ADDITIONAL TESTS

CN - CONSOLIDATION	SA - GRAIN SIZE ANALYSIS
CP - COMPACTION	SW - SWELL TEST
DS - DIRECT SHEAR	TV - TORVANE SHEAR
PM - PERMEABILITY	UC - UNCONFINED COMPRESSION
RV - R-VALUE	WA - WASH ANALYSIS
CT - CORROSIVITY TESTING	

GROUND WATER LEVELS



WATER LEVEL DURING DRILLING



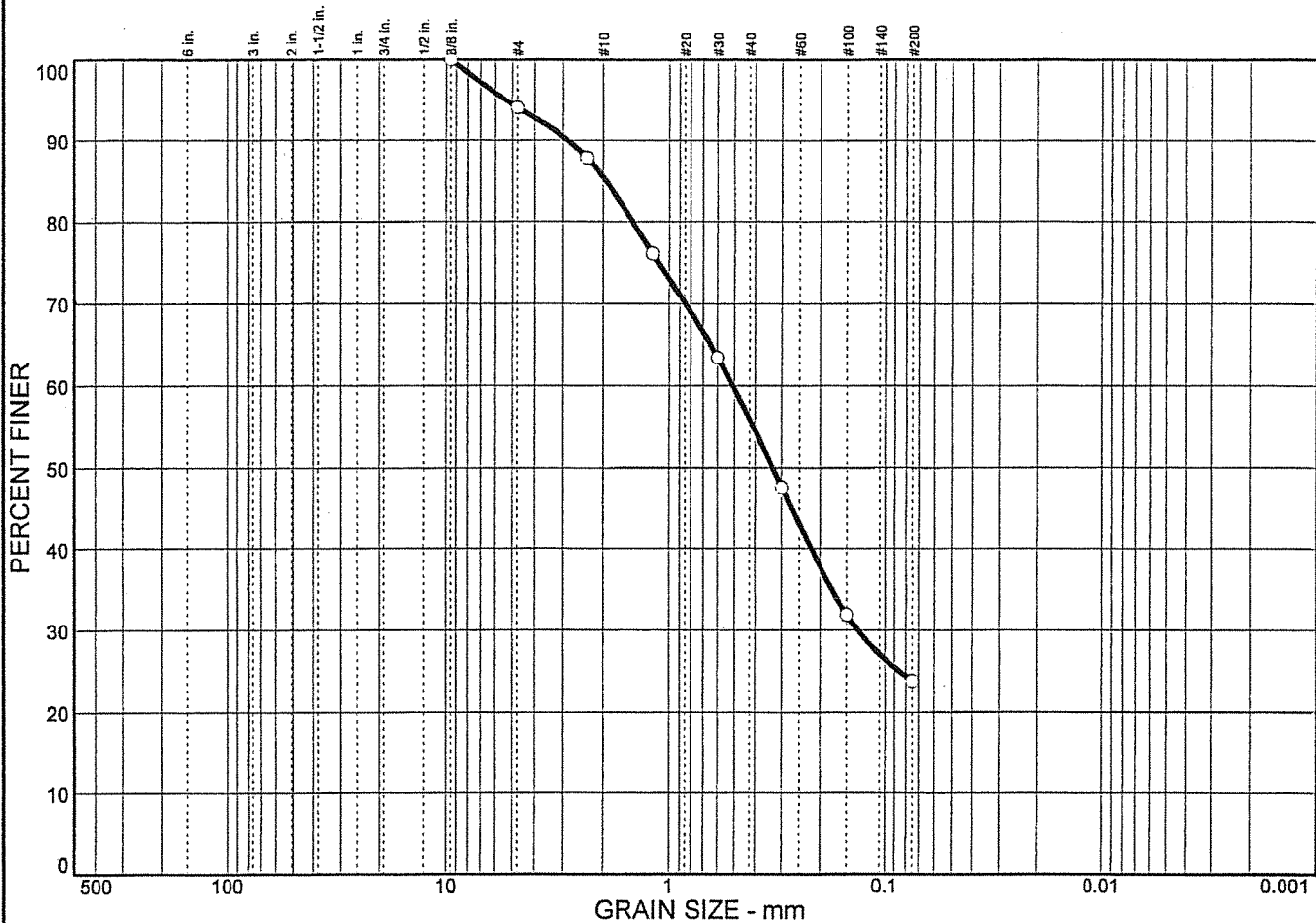
STABILIZED WATER LEVEL



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LEGEND TO TEST PIT LOGS AND SOIL DESCRIPTIONS

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	6.0	70.2	23.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
#4	94.0		
#8	87.8		
#16	76.1		
#30	63.4		
#50	47.6		
#100	31.9		
#200	23.8		

* (no specification provided)

Material Description
Greyish brown silty sand

Atterberg Limits
 PL= NP LL= NV PI= NP

Coefficients
 D₈₅= 1.94 D₆₀= 0.511 D₅₀= 0.331
 D₃₀= 0.133 D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks
 Composite of TP-3, 4, & 5
 Weathered rock broken up with light effort

Sample No.: C-1
Location:

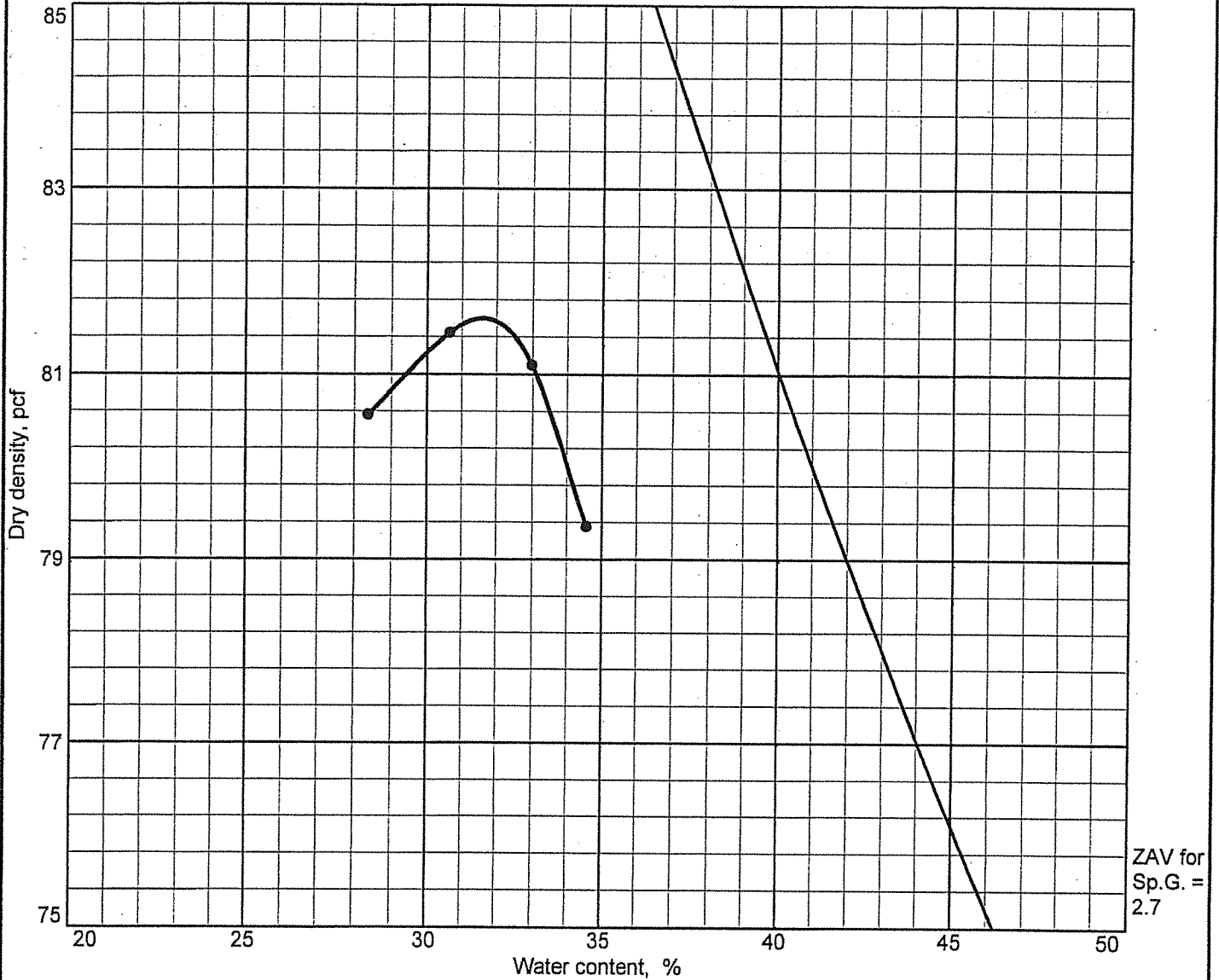
Source of Sample:

Date: 5-16-07
Elev./Depth: n/a

Blackburn Consulting
Auburn, California

Client: Hanson Engineering
Project: Vallecito Reservoir - "Redd Property"
Project No: 869.2

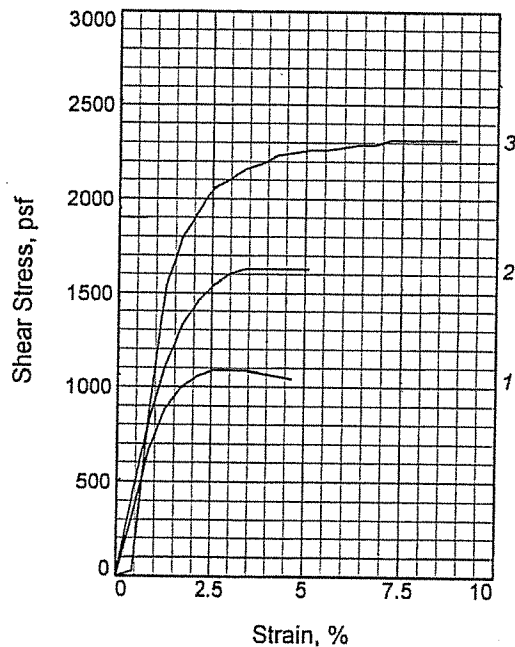
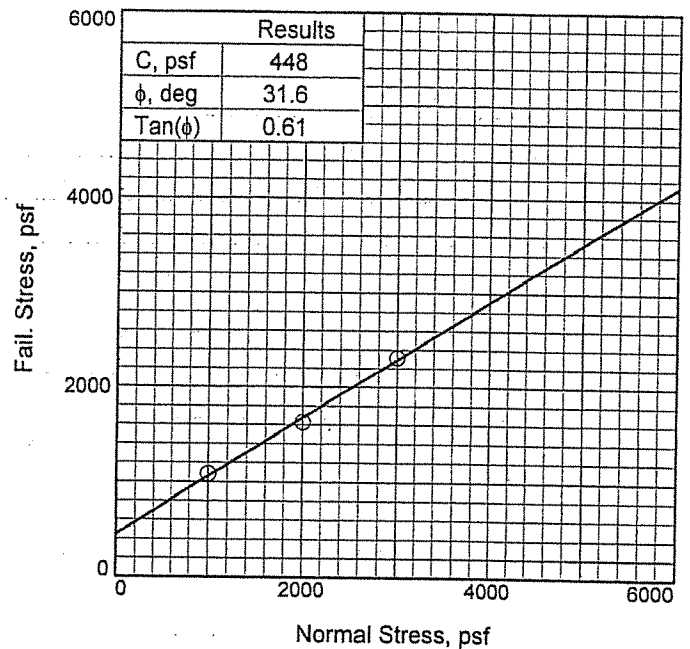
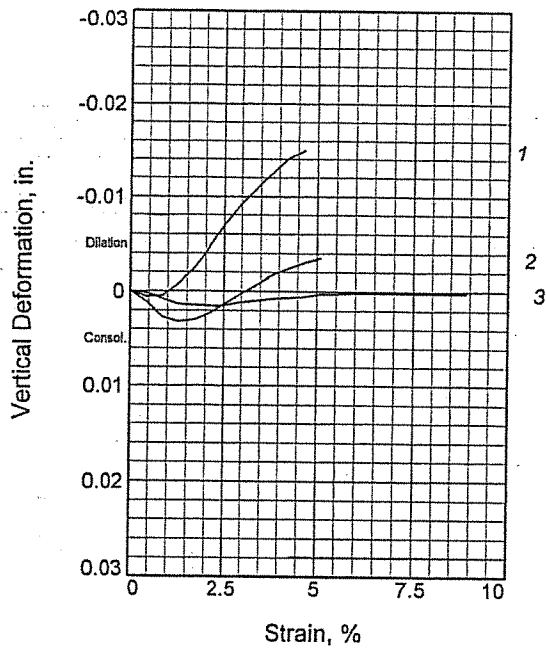
COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
n/a	SM				NV	NP	0.0	23.8

TEST RESULTS			MATERIAL DESCRIPTION	
Maximum dry density = 81.6 pcf			Greyish brown silty sand	
Optimum moisture = 31.6 %				
Project No. 869.2 Client: Hanson Engineering			Remarks: Weathered rock broken up with light effort Composite of TP-3, 4, & 5 NV = No value NP = Nonplastic	
Project: Vallecito Reservoir - "Redd Property"				
● Source: Sample No.: C-1 Elev./Depth: n/a				
Blackburn Consulting				
Auburn, California				



Sample No.		1	2	3
Initial	Water Content, %	34.1	32.8	30.0
	Dry Density, pcf	79.8	80.5	82.4
	Saturation, %	82.8	81.0	77.6
	Void Ratio	1.1131	1.0938	1.0447
	Diameter, in.	2.36	2.36	2.36
	Height, in.	0.94	0.94	0.94
At Test	Water Content, %	36.6	35.1	32.9
	Dry Density, pcf	84.8	86.5	89.2
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.9868	0.9476	0.8892
	Diameter, in.	2.36	2.36	2.36
	Height, in.	0.89	0.88	0.87
Normal Stress, psf		1000	2000	3000
Fail. Stress, psf		1086	1630	2316
Strain, %		2.5	3.4	7.2
Ult. Stress, psf				
Strain, %				
Strain rate, %/min.		0.20	0.20	0.20

Sample Type: Remolded

Description: Greyish brown silty sand

LL= NV

PI= NP

Assumed Specific Gravity= 2.7

Remarks: Composite of TP-3, 4, & 5

NV = No Value

NP = Nonplastic

Client: Hanson Engineering

Project: Vallecito Reservoir - "Redd Property"

Sample Number: C-1

Depth: n/a

Proj. No.: 869.2

Date Sampled: 5-16-07

DIRECT SHEAR TEST REPORT

Blackburn Consulting

Tested By: JRM